

PREPUTIAL SURGERY IN THE BULL

by

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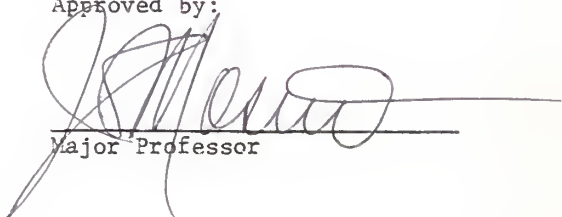
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INTRODUCTION

Failure of normal extension and retraction of the penis and prepuce in the male bovine of breeding age is cause for concern. Injury to the tender preputial tissue is a common occurrence, particularly in the young, sexually aggressive male. Mosaheb and Ladd (1973) examined 500 slaughter-bulls and found lesions of the prepuce, penis, and scrotum in one hundred and nine. Seventy-six percent of the bulls were classified as mature and 24% were classified as old.

Lesions associated with prolapse of the prepuce include ulceration, gangrenous cellulitis, and epidermoid cysts. Exposure of the parietal portion of the prepuce to external influences such as sunlight, dust, or sharp objects can occur any time extension of the penis is affected or when the prepuce is relaxed with the animal in a standing position as at time of micturition or defecation.

Certain breeds, particularly those of the *Bos indicus*, have pendulous sheaths and are prone to prolapse of the prepuce, thus rendering it susceptible to irritation or injury. Long (1969) observed frequent eversion of the prepuce of bulls at an artificial insemination center and found that 85% of the polled bulls, but less than 2% of the horned bulls, everted.

Trauma or irritation of the parietal tissue of the prepuce will result in swelling and edema and subsequent interference of normal penile movement and prevention of full extension of the penis. Effective breeding depends on the deposition of spermatozoa in the area of the cervical os of the female and nearly full extension of the penis is required for proper placement.

Failure to effect corrective measures will result in fibrosis of the subparietal tissue and a penis that can be extended only a few centimeters, if at all. In most bulls, the trauma occurs to the preputial mucosa covering the erect penis. When the penis is retracted into the prepuce, the traumatized portion is folded on itself, thus allowing adhesions to develop. Repeated attempts at protrusion serve to further irritate the tissue and increase the tendency to fibrose.

Because of the location of the lesion at the fornix of the prepuce, normal penile extension is restricted. Erection can occur, but protrusion is slight. Surgical procedure must be undertaken in an attempt to relieve the stricture and allow normal penile extension. The breeding value of the bull, location of the lesion, and capabilities for aftercare, all must be considered before surgery is attempted.

Many promising young herd sires, and many older proven sires have been removed prematurely from the breeding herd because of the trauma to the preputial tissue. Corrective surgery and proper aftercare should reduce the number of bulls which have been prematurely removed. The purpose of this study was to investigate a new technique designed to prevent unwanted complications following surgical treatment of preputial injuries.

REVIEW OF LITERATURE

In the breeding age bull the penis is retracted into the sheath when the bull is quiescent. The internal layer of the prepuce, because of its attachment to the penis about 12 cm distal to the glans penis, becomes folded upon itself.

Penile extension necessary for breeding comes from the sigmoid flexure of the penis located just posterior to the scrotum. This flexure is effaced during erection. As the penis is extended past the preputial orifice the prepuce unfolds until at full extension the tissue covering the erect penis is taut and susceptible to injury.

Young, inexperienced bulls pastured together will attempt to mount each other and also engage in masturbation increasing the possibility of trauma to the preputial tissue.

Donaldson and Aubrey (1960) describe the anatomical structures of the prepuce of the bull, noting that the parietal layer of the prepuce is loosely attached to the underlying tissue by an extensive and loose connective tissue. The prepuce of the bull consists of two parts: the external layer and the internal layer.

The external layer, or sheath, is skin covered with hair and extends from the scrotum to within 6 cm of the umbilicus where the external layer is reflected vertically and laterally, forming the thick margin of the preputial orifice. Coarse hair up to 10 cm in length marks the preputial orifice which is large enough to admit a finger readily. Dorsally the external layer is continuous with the abdominal wall. In the mature bull the mucous membrane of the internal parietal layer of the prepuce extends about 35 cm posterior (caudal) from the preputial orifice and then

turns forward on the penis as the visceral layer terminating as the epithelium of the penis approximately 12 cm distal to the cranial end of the penis (Sisson, 1953).

The visceral layer is loosely attached to the body of the penis but it is closely attached to the glans penis. According to Sisson (1953) the internal parietal layer of the prepuce is covered with squamous, stratified epithelium and coiled tubular glands which are involuntary and have a serous-mucoid secretion that serves as a lubricant for the preputial and penile tissue. The visceral layer is glandless.

There are two pairs of preputial muscles which are derivatives of the cutaneous muscle. The anterior preputial muscles, or protractors, are two flat bands, 5 cm or more in width which arise close together in the xiphoid region about 20 cm in front of the preputial orifice. They diverge around the umbilicus and then unite behind the preputial orifice and act to draw the prepuce forward.

The posterior preputial muscles, or retractors, arise in the inguinal region and converge on the anterior portion of the prepuce. They draw the prepuce backward. These muscles vary greatly. The retractor muscles may be absent. Many fibers come from the cutaneous muscle on either side, dip under the protractor, and are inserted into the skin just behind the preputial opening.

The pudic nerve pursues a flexuous course along the dorsum penis and ramifies in the glans penis and the penile layer of the prepuce (Sisson, 1953). It has both sensory and motor function.

In some bulls the cranial muscles of the prepuce are important in the prevention of preputial eversion, probably by their sphincteric action on the preputial orifice (Ashdown and Pearson, 1973).

The retractor muscle of the penis is an unstriated muscle that is a continuation of the suspensory ligaments of the anus. About 2 to 5 cm separate its two parts on the root of the penis where they lie in a groove on either side of the bulbocavernosus. They are close together and pass on either side of the ventral curve of the sigmoid flexure. As they progress forward they are on the ventral surface of the penis and terminate about 15 cm behind the glans (Sisson, 1953).

According to Ashdown and Pearson (1973) the retractor muscle of the penis plays an important role in returning the penis to the sheath after service and to a lesser extent in preventing prolapse of the penis.

Habitual eversion is common among polled bulls of the British breeds but uncommon among horned bulls (Long and Hignett, 1970). Bulls of the Brahma and Santa Gertrudis breeds as well as the Angus and Polled Hereford are particularly prone to this condition (Larson, 1971).

The predisposition to preputial prolapse in the Brahma and Santa Gertrudis breeds is due to the loose attachment of the prepuce to the abdomen (Roberts, 1956, Arthur, 1964).

Lagos and Fitzhugh (1970) scored the tendency to prolapse on 113 yearling, second cross (3/4 Santa Gertrudis, 1/4 British) bulls. The length of the everted tissue was scored rather than the frequency of eversion. The length of the sheath, internal diameter of the preputial orifice, external circumference of the sheath, and the body weight were determined.

A statistically significant difference was found in the preputial prolapse score among base breeds and sires indicating that culling bulls with a predisposition to prolapse should decrease that trait in the breeding population.

Long and Hignett (1970) dissected the preputial tissue from 20 horned bulls and 10 polled bulls. Seven of the polled bulls and 19 of the horned bulls had been observed alive with all of the polled bulls everting preputial epithelium and only one of the horned bulls. The horned bulls all had well developed retractor muscles of the prepuce but these were absent in the polled bulls. There were no other anatomical differences.

Perhaps the retractor muscle of the prepuce stabilizes the preputial epithelium during penile movement and prevents eversion. The retractor muscle has an extensive insertion some 10 cm on each side of the parietal preputial epithelium. The insertion seems to be into the loose connective tissue below the epithelium. In the absence of this muscle the epithelium will be moved forward by the advancing penis and be pushed out of the orifice. Observations have demonstrated that eversion is related to penile movement (Long and Dubra, 1972).

Chronic prolapse of the parietal layer of the prepuce may lead to preputial injuries and related breeding difficulties. According to Monke (17) this occurs when the exteriorized epithelium of the prepuce becomes traumatized and inflamed to the extent that retraction is impossible. Supple-Kane (1969) commented on the effect of low scrub brush containing sharp barbed thorns of the type found in Africa as well as in western ranges of the United States on bulls with a loosely attached, pendulous sheath and a habit of everting.

Contributing to the pathology that develops subsequent to trauma of the parietal layer of the prepuce is the habit of the bull to urinate without extending the penis or everting the prepuce causing the urine to be deposited in the preputial cavity. Bacterial action on the urea present produces ammonia which is irritating to the tissue causing an increase in

the inflammatory process and contributing to the formation of fibrous tissue (Milne, 1954).

Long and Dubra (1972) studied 485 bulls of 11 different breeds and found that the presence of ulcers was shown to be statistically unrelated to eversion.

Ulceration, gangrenous cellulitis, and epidermoid cysts, as well as fibrosis are often the sequelae to preputial eversion and resulting trauma to the parietal layer (Mosaheb and Ladds, 1973).

Donaldson and Aubrey (1960) observed that the pain associated with mating when there was preputial damage seemed to cause a negative response resulting in a refusal to mate.

Various techniques have been attempted to relieve the strictures and fibrosis which prevent normal penile movement. Walker (1966) used a piece of rigid tubular plastic 2-5 cm in diameter through which holes had been drilled. The tube was inserted into the preputial cavity and attached by sutures producing a tourniquet-like effect just above the prolapsed mass. The entire prolapsed mass then sloughed within one or two weeks. A second soft plastic tube was sutured around the glans penis to drain the urine from the preputial cavity. This technique resulted in the loss of equal amounts of the external and internal lining of the prolapsed portion.

Surgical amputation is mentioned by Gibbons (1956) who sutured the preputial lining to the external orifice with interrupted sutures of #2 catgut.

Both Milne (1954) and Lenert (1956) tried to avoid stricture at the preputial orifice by removing a triangular portion of tissue from the ventral sheath and suturing the internal layer of the prepuce to the external layer using interrupted sutures of catgut.

Hattangady et al. (1968) successfully treated seven of eight cases by preserving the preputial orifice and as much of the internal layer as possible and carefully coapting the incised edges.

A conservative resection technique was used by Larsen and Bellenger (1971) and was successful in 13 of 15 cases. This entailed preserving as much of the internal layer of the prolapse as possible with emphasis placed on complete removal of all fibrous tissue and careful hemostasis. At least half of the internal layer was preserved in all cases. The internal layer was sutured to the skin using interrupted vertical mattress sutures of #0 silk.

Pearson (1972) reviewed 121 cases involving the male genital tract with the following results:

Penile neoplasia	30
Rupture of corpus cavernosum penis	15
Preputial prolapse	12
Ulceration and fibrosis of prepuce	10
Miscellaneous	54

Surgical intervention was attempted on the ten bulls with fibrosis of the prepuce. Four of the bulls had the scar tissue incised followed by frequent teasing. All developed a further stricture. Using a technique of excising the fibrotic tissue between two annular rings was successful on the remaining six bulls. The incised mucosal borders were coapted with #4 chromic catgut and the bulls were teased regularly for 10 days.

Reddy et al. (1971) demonstrated the presence of *Bacillus* spp., *Staphylococcus pyogenes*, *Proteus vulgaris*, *Pseudomonas pyocyanea*, and *Staphylococcus epidermides* in preputial washings. The bacterial count was

higher in older bulls with a pendulous sheath than in bulls with a closely attached sheath.

Flushing of the prepuce with 1,000,000 units of crystalline penicillin in saline significantly lowered the bacterial count in the prepuce and in the semen for a period of 30 days.

MATERIALS AND METHODS

Twelve Polled Hereford bulls eighteen months of age, weighing 800 pounds were obtained from the Department of Animal Science and Industry at Kansas State University. These bulls had been culled from a group of fifty bulls that had been grazed on bluestem pasture during the summer season. Their general physical condition was excellent. Each bull was given a physical examination that included the use of an ejaculator^{*} to induce penile extension for examination for the presence of scar tissue or neoplasms. No pathology was found in any of the bulls examined.

The twelve bulls were arbitrarily divided into two groups. Group A contained bulls #6169, #6084, #6007, #6014, #617, and #6162. Group B. included bulls #6131, #6165, #6041, #6094, #6088, and #6166.

In Group A the ejaculator was used to extend the penis to its full length. The glans penis was grasped with a towel to assist in maintaining full extension. In an attempt to reproduce a naturally occurring lesion, a jagged tear was made in the parietal tissue of the prepuce just distal to the attachment of the prepuce to the penis (Fig. 13). Towel forceps were used to grasp the preputial tissue and effect the tear.

A four-week period was allowed for adhesions and/or fibrosis to occur on the injured bulls before corrective surgery was attempted. No effort was made during this period to cause continued irritation or to subject the tissue to bacterial contamination other than that normally encountered.

The bulls were kept in a large pen and fed hay and grain from bunks along one side of the pen. Rainfall was above normal for this time of the year and the pen at times was muddy but drainage was good.

* Lane Manufacturing Inc., Denver, Colorado.

Five minutes prior to being placed in the surgery chute, each bull was given a sedative dose of 15 mg of xylazine¹ intramuscularly. The rotary surgery chute was used to place the bull in lateral recumbency and each leg was restrained with one-inch nylon rope.

Ten milligrams of Acepromazine Maleate³ was given intravenously to relax the penis and prepuce and the hair around the preputial orifice was clipped with a #40 blade for a distance of 15 cm around the orifice.

The clipped area was scrubbed for three minutes with an iodine soap² and rinsed with warm water.

An assistant inserted his gloved hand into the rectum of the bull and using gentle digital pressure massaged the prostate gland and seminal vesicles until the glans penis protruded from the sheath and could be grasped with a hand towel. In most instances this could be accomplished within 30 seconds.

With the penis fully extended and held in place by an assistant using either a hand towel or a towel forcep through the fibrous tissue on the dorsum of the penis, the entire penis was scrubbed for two minutes with an iodine surgical soap and rinsed with warm water. The penis was drawn through the 12 cm x 18 cm opening in the cotton 120 x 150 cm drape and the drape was anchored in place with four towel forceps.

Another scrub of one minute duration using an iodine surgical soap was done and the penis was rinsed with sterile saline solution. A soft rubber tourniquet was placed around the penis as close to the preputial orifice as possible and tied tightly to control hemorrhage.

¹Rompun, Bayvet Corporation, Shawnee, Kansas.

²Betadyne Surgical Scrub, Purdue-Frederick Co., Norwalk, Connecticut.

³Acepromazine Maleate, Ayerst Laboratories, New York, New York.

Five milliliters of 2% lidocaine⁴ were injected as a ring block under the parietal layer of the prepuce midway between the tourniquet and the glans penis.

Surgery consisted of an annular incision around the penis through the parietal layer of the prepuce approximately 5 cm caudal to the preputial-penile attachment and behind the area of fibrosis. A second annular incision around the penis was made at the preputial attachment to the penis and the mucous membrane between the two incisions was carefully dissected leaving as much of the elastic submucosal tissue as possible but removing all of the fibrous tissue that had developed as a sequelae to the artificially induced lesion. The two edges were brought into apposition using a horizontal mattress suture of #0 Dexon⁵ spaced every .5 cm and applied with moderate tension. Every effort was made to visually maintain correct tissue alignment.

On bulls #6169, #6084, and #6162 from Group A, the bulls #6131, #6166 and #6041 from Group B, a pressure bandage to control swelling was applied to the extended penis for 48 hours. The penis was covered with a furacin⁶ ointment and an ointment-impregnated 4 x 4 gauze sponge was wrapped around the incision line. Four-inch gauze bandage was wrapped tightly around the penis in a double layer taking care to include the glans penis. Two layers of elastic adhesive⁷ bandage were wrapped tightly over the gauze bandage and the penis. The elastic adhesive bandage was anchored in place with a single stay suture of heavy synthetic⁸ at the preputial orifice. In this

⁴Lidocaine, Vitarine Company, New York, New York.

⁵Dexon, Davis and Geck, Pearl River, New York.

⁶Furacin, Eaton Laboratories, Norwich, New York.

⁷Elastikon, Pittman-Moore Co., Indianapolis, Indiana.

⁸Vetafil, Bengen Laboratories, Germany.

manner the penis was maintained in an extended position. The tourniquet was removed.

Forty-eight hours later the bandage was removed, the penis and prepuce cleansed with warm water and surgical soap and the penis returned to its normal position. A purse string suture of heavy synthetic was placed in the preputial orifice and the suture tightened until only the forefinger could pass through the preputial orifice. This helped retain the penis in its normal position for 24 hours at which time the suture was removed.

Post-operative care consisted of daily flushing of the prepuce with 1,000,000 units of crystalline penicillin G⁹ dissolved in 500 ml of saline for three days and then daily flushing with saline only for an additional seven days.

Bulls #617, #6007, #6041, from Group A and bulls #6165, #6094, and #6088, from Group B had identical surgery performed but the penis was not wrapped. Aftercare consisted of flushing the penis and prepuce with penicillin and saline for three days and saline only for an additional seven days.

Surgery was completed on all twelve bulls over a three week period.

Sixty days following surgery on the last bull all of the animals were confined and examined. The ejaculator was used to extend the penis of each bull to its maximum length. The surgical site was examined visually and palpated for areas of fibrosis and the bull's ability to achieve maximum extension was determined.

These bulls were slaughtered commercially and the penis and preputial tissue were recovered. Excess tissue was removed from the penis and

⁹Pfizercillin, Pfizer Laboratories, New York, New York.

prepuce and photographs were taken. Ten percent neutral buffered formalin was used to fix the tissue for a two-week period. Sections were taken from the surgical scar and routinely imbedded in a paraffin block. Tissue sections eight microns in thickness were stained with hematoxylin and eosin and examined microscopically.

RESULTS

Bull #6169 was examined 30 days following induced injury. An area of scar tissue 2 cm in diameter and 1 cm in thickness was present on the dorso-lateral surface of the extended penis 3 cm caudal to the attachment of the prepuce to the penis. There was no interference with normal penile extension.

Surgery was performed and a pressure bandage applied for 48 hours. At that point the bandage was removed and the penis was gently cleansed with soap and water. The epithelial layer of the penis and prepuce was discolored and ischemic areas 1-2 cm in circumference were present. An ointment* was applied liberally to the penis and prepuce and an attempt made to return the penis to its normal position. This attempt was only partially successful with approximately four inches of the penis protruded from the sheath. Normal retraction of the penis occurred six days after removal of the pressure bandage.

Sixty days following surgery the bull was stimulated electrically to produce extension of the penis. The scar tissue prevented the penis from being extended to its full length. On examination the area of scar tissue was midway between the surgical site and the mucocutaneous junction of the preputial tissue and skin (Fig. 1).

Histopathological examination of the recovered penis and prepuce following slaughter revealed normal healing at the site of the surgery but extensive fibrosing of the epithelium and underlying tissue midway between the surgical site and the preputial orifice.

* Morumide Ointment, Beecham-Massengill, Bristol, Tennessee.

Bull #6084 was examined 30 days following induced injury and a 2 cm area of scar tissue about .5 cm in thickness noted at the site of the preputial tear (Fig. 13).

Surgery was performed and a pressure bandage applied for 48 hours. At that point the bandage was removed and the penis and prepuce cleansed with soap and water. The epithelial layer had small areas of necrosis from the pressure bandage. Over the next 10 days there was a gradual sloughing of the dorsal portion of the epithelium of the penis and prepuce and the bull was unable to completely retract the penis. Approximately 6 cm of the penis protruded from the orifice.

On the tenth day, the bull's stallmate stepped on the portion of the penis that protruded from the sheath and amputated the distal 5 cm of the penis (Fig. 2). An astringent^{*} was applied as a hemostatic agent to control capillary hemorrhage from the penile stump.

An attempt was made to extend the penis on this bull 60 days following surgery. It was not successful due to extensive fibrosis.

When the preputial and penile tissue was recovered at slaughter an abscess 1 inch in diameter was found on the dorsum of the penis. *Corynebacterium pyogenes* and a hemolytic streptococcus were cultured from the abscess.

Histopathological examination of the abscessed area showed the typical rim of polymorphonuclear leukocytes, connective tissue, and a caseous center. Along the suture line very little fibrous tissue could be found.

The penis of bull #6166 was bandaged following surgery. No scar was present at the site of the preputial tear. Cleansing of the penis

^{*}Fluffy Tannic Acid, Curts Laboratories, Kansas City, Missouri.

following removal of the bandage in 48 hours revealed a hyperemic epithelium but the penis easily returned to its normal position. There seemed to be minimal discomfort and swelling and the post-operative period was uneventful.

When the penis was extended 60 days after surgery, full extension was achieved and the incision line was normal (Fig. 3). The subepithelial layers, as viewed microscopically, contained very little fibrous tissue.

Bull #6007 had only a small 1 cm scar at the site of the tear and was left unbandaged after surgery on the prepuce. When the penis was extended 60 days after surgery, healing had taken place and full extension of the penis was achieved (Fig. 4). A small papilloma .5 cm in diameter was noted on the glans penis.

Microscopic examination of the sectioned epithelium revealed little leukocytic infiltration and no fibrosis.

Bull #6162, when examined prior to surgery, had a 2 cm scar 1 cm thick on the dorso-lateral aspect of the penis where the preputial tissue had been torn 30 days earlier.

When the pressure bandage was removed from the penis after 48 hours, the epithelial tissue of the penis and prepuce was in a satisfactory condition and the penis returned to its normal position without difficulty after it was carefully cleansed with warm saline.

There was no interference with the extension of the penis when the bull was examined 60 days after surgery and the incision had healed in a normal manner (Fig. 5). Histopathological examination revealed fibrous connective tissue along the line of incision. Mononuclear lymphocytes and polymorphonuclear lymphocytes were scattered throughout the area.

Bull #6088 was examined prior to surgery and no abnormalities were found. The prepuce had not been damaged artificially. Following preputial surgery the penis was left unbandaged and easily returned to its normal position in the sheath.

When examined 60 days later, little tissue reaction to the preputial surgery could be seen (Fig. 6) and penile extension seemed to be normal. Histopathological examination of the preputial tissue along the incision line confirmed the lack of pathology in the preputial tissue.

On bull #617, at the time of surgery a small .5 cm scar was noted where the preputial tear had been inflicted in the prepuce but it was not significant. No discomfort or swelling of the surgery site occurred and the recovery period was uncomplicated and uneventful. The penis was not bandaged following surgery.

Sixty days post-operatively the penis was extended using the electro-ejaculator and examined (Fig. 7). Good healing had taken place with very little fibrosing of the prepuce along the suture line. The penis could be fully extended without difficulty.

There was very little reactive tissue beneath the preputial epithelium at the surgery site. Capillary development was present with lymphocytes and plasma cells scattered throughout.

The penis and prepuce of bull #6131 were normal when they were examined 30 days prior to surgery and again at the time of surgery. There had been no attempt to create a lesion. The penis was bandaged for 48 hours but easily returned to the prepuce after being cleansed with soap and warm water following removal of the bandage. The post-operative period was free of complications.

When the penis was examined after 60 days (Fig. 8) there was a minimal amount of scar tissue at the preputial-penile junction, the site of the surgery. Penile extension was complete and without difficulty. A small amount of connective tissue was found beneath the preputial epithelium at the suture line when it was examined histopathologically.

The penis and prepuce of bull #6165, when examined at the start of the project, were normal and no attempt was made to create a lesion prior to surgery. No pain or swelling was noted in the preputial tissue following surgery. The penis was not bandaged.

When the bull was examined at 60 days using the electroejaculator to extend the penis, the preputial epithelium had healed nicely (Fig. 9). Penile extension was easily achieved and there was no pathology found on histopathological examination of the surgery site.

Two small papillomatous growths about 1 cm in diameter were noted on the penis of bull #6041. One was just distal to the glans and the other just distal to the junction of the prepuce and penis. At the time of the preputial surgery these small neoplasms were excised and the blood vessels ligated with #0 plain catgut. The penis was bandaged for 48 hours.

On the fourth day following surgery some swelling and tenderness was present on the incision line when it was palpated externally through the preputial wall. No attempt was made to examine the penis to determine the cause of the swelling. Warm saline flushed into the preputial cavity for seven days had little effect on the swelling.

On evaluation of the surgery at 60 days the bull was unable to extend the penis which seemed to be firmly adhered to the wall of the prepuce. When the tissue was recovered at the time of slaughter fibrous tissue 5 cm in length and 2 cm wide on the ventral portion of the prepuce just distal

to its attachment to the penis prevented penile extension. A large abscess about 2 cm in diameter was found in the fibrous tissue (Fig. 10). Histo-pathological examination revealed granulation tissue, numerous capillaries and fibrous tissue, pockets of pus and necrotic areas, and an infiltration of the area with polymorphonuclear lymphocytes.

Bull #6014 was examined and found to have a penis and prepuce that were free of lesions and no attempt was made to create any pathological condition. The penis was not bandaged. The post-surgery period presented no problems and when the bull was examined after 60 days only a small amount of fibrous tissue could be seen at the line of incision (Fig. 11) with about .5 cm bulging of the epithelium as evidenced. There was no interference with normal penile extension.

Some polymorphonuclear leukocytes were interspersed throughout the fibrous tissue along the incision line but the epithelium had healed in a normal manner and there was no reactive tissue seen on microscopic examination.

No lesions were seen on the prepuce and penis of bull #6094 when he was examined prior to surgery and none had been attempted. The penis was not bandaged.

Sixty days following surgery the prepuce and penis were examined. There was a .5 cm ridge in the epithelium of the prepuce that completely encircled the penis (Fig. 12) but did not interfere with normal penile extension. Microscopic examination of the surgery site revealed a slightly thickened, more folded, uneven epithelium but otherwise healing had occurred in a satisfactory manner.

DISCUSSION

Many bulls of the Santa Gertrudis, Brahma, Angus and Polled Hereford breeds are removed from the breeding herd each year because of injury to the penis and prepuce. Such injury occurs primarily when the penis is erect during the act of breeding; however, the habit of everting the prepuce during micturition or defecation may also expose the delicate tissue to injury.

The habit of the bull to urinate without extending the penis causes urine to be deposited in the preputial cavity. Chronic irritation to any preputial lesion results, with fibrosis or ulceration a common sequela.

Since normal penile extension is dependent on pliable, elastic preputial tissue, the presence of fibrous tissue acts as a deterrent and at times can prevent any penile extension.

Surgery to remove only the fibrous tissue has met with limited success as fibrosis tends to reform to an even greater extent following its removal.

If the affected tissue is removed between two annular surgical rings and the normal tissue sutured together, healing occurs in an even manner without stress and the elasticity of the preputial tissue that is essential for penile extension is preserved. Using this method most bulls with fibrotic lesions at the junction of the penis and prepuce can be returned to service.

The attempt to induce sufficient fibrosis to prevent penile extension was not successful in the six bulls in which it was attempted. Small raised fibrotic lesions were produced in two of the bulls and two of the others had a small smooth scar resulting from the induced trauma.

Failure of this attempt was probably due to early wound healing in a normal environment within the prepuce with minimal bacterial contamination. Had the bulls been active sexually the wound would have been subjected to repeated irritation from the preputial hair and contact with the perineal region of the cow. Chances of bacterial contamination with resulting sepsis of the traumatized tissue would have been greatly increased.

Sedation of the bulls with 15 mg of xylazine¹ was quite satisfactory as all of the bulls were able to walk into the chute prior to surgery and were ambulatory when released from all restraints.

The intravenous injection of 10 mg of Acepromazine Maleate² greatly facilitated maintaining the penis in an extended position for the surgical procedure. It did, however, necessitate the placing of a purse string suture in the skin of the preputial orifice to hold the penis in the preputial cavity until the effects of the Acepromazine Maleate had subsided.

At the time of post-surgical evaluation, electrical stimulation to extend the penis was used. The extended penis was examined for evidence of scarring, full extension, and breeding capabilities of the bull. Bulls #6041, #6169, and #6084 were unable to extend the penis because of extensive fibrosis of the preputial tissue but the remaining nine bulls were judged ready to be placed in the breeding herd. Each of the bulls had epithelial damage to the penile and preputial tissue from the pressure bandage with the subsequent development of fibrous tissue and abscessation.

Trauma to the epithelial tissue of the penis and prepuce effectively removed the barrier to infection provided by the epithelium and predisposed the area to the formation of abscesses in bull #6041. Since the penis was

¹Rompun, Bayvet Corporation, Shawnee, Kansas.

²Acepromazine Maleate, Ayerst Laboratories, New York, New York.

retracted into the prepuce the irritated preputial tissue was folded upon itself, and with no penile extension being encouraged, the contact of the inflamed tissue layers resulted in adhesions forming.

The results demonstrate that fibrous tissue removal between two annular rings can successfully return a bull to active service. This observation is consistent with findings reported by Pearson.

The practice of pressure bandaging the penis in an extended position for forty-eight hours to reduce swelling was deemed unsuccessful as all of the major complications following surgery were the direct result of the bandaging.

SUMMARY

Twelve Polled Hereford bulls, approximately eighteen months of age were used to determine if preputial surgery to relieve fibrosis at the penile preputial junction was feasible. Since all twelve bulls were normal, an attempt was made to create a fibrous lesion on the prepuce of six of the bulls and surgery on the prepuce was performed 30 days later.

The surgery consisted of removal of the affected preputial tissue between two annular ring incisions completely encircling the penis, then suturing the two edges of the prepuce together.

Following surgery the penis of three injured bulls and three uninjured bulls were wrapped in an extended position for 48 hours. The bandage was then removed, the penis cleansed and returned to the prepuce and a crystalline penicillin in saline irrigation begun. The penis and prepuce were flushed daily for three days and then flushed with saline only for seven additional days.

Three of the traumatized bulls and three of the normal bulls were not bandaged post-surgically. The penis and prepuce were flushed for three days with crystalline penicillin G in saline and then for seven days with saline solution only.

The principal post-surgical complication occurred in the bandaged bulls when too tight bandaging necrosed the epithelium resulting in abscess formation and fibrosis with adhesions preventing normal penile extensions.

Nine of the bulls could have returned to service with no difficulty.

The value of the preputial flushing for seven days following surgery is questionable in the light of the work done by Reddy demonstrating that a single preputial flushing with crystalline penicillin G in saline substantially reduced the bacterial count in the prepuce for a period of 30 days.

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TABLE
Surgery Results

Bull	Induced Trauma	Bandaged Post-Surgically	Adhesions	Fibrosis	Impaired Extension	Unimpaired Extension
#6169	+	+	+	+	+	
#6084	+	+	+	+	+	
#6166		+				+
#6007	+					+
#6162	+	+				+
#6088						+
#617	+					+
#6131		+				+
#6165						+
#6041		+	+	+	+	
#6014	+					+
#6094						+

Fig. 1. Bull #6169

Extensive fibrosing of epithelium between the surgical site and the preputial orifice. Penis was bandaged.

Fig. 2. Bull #6084

End of penis blunted from accidental amputation. Abscess on dorsum of penis. Penis was bandaged.

Fig. 3. Bull #6166

Good healing. Full penile extension achieved. Penis was bandaged.

Fig. 1



Fig. 2



Fig. 3

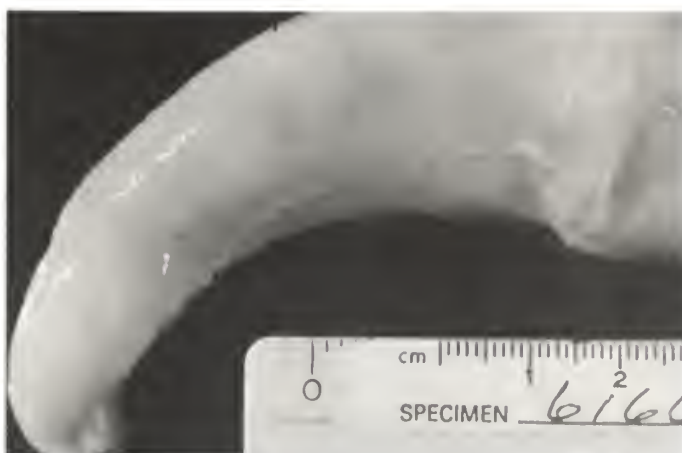


Fig. 4. Bull #6007

Surgical site healed smoothly. Penis not bandaged.

Fig. 5. Bull #6162

More fibrous tissue along line of incision but no interference with extension. Penis was bandaged.

Fig. 6. Bull #6088

Good healing and minimal scar tissue. Penis not bandaged.

Fig. 4



Fig. 5



Fig. 6



Fig. 7. Bull #617

Good healing. Penis not bandaged.

Fig. 8. Bull #6131

Good healing. Penis bandaged.

Fig. 9. Bull #6165

Good healing. Penis not bandaged.

Fig. 7



Fig. 8



Fig. 9



Fig. 10. Bull #6041

Fibrous tissue on ventral portion of penis. Two centimeter abscess present in fibrous tissue. Penis was bandaged.

Fig. 11. Bull #6014

Some bulging of epithelium at the site of the surgery. No interference with penile extension. Penis not bandaged.

Fig. 12. Bull #6094

Epithelium slightly thickened and more folded. No interference with normal extension of the penis. Penis not bandaged.

Fig. 10

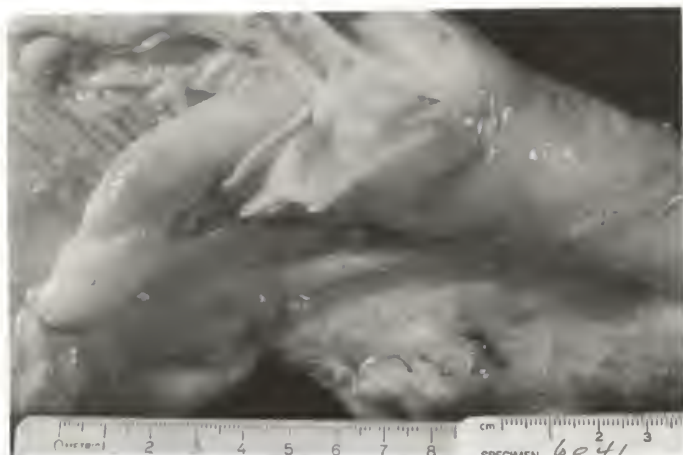


Fig. 11



Fig. 12



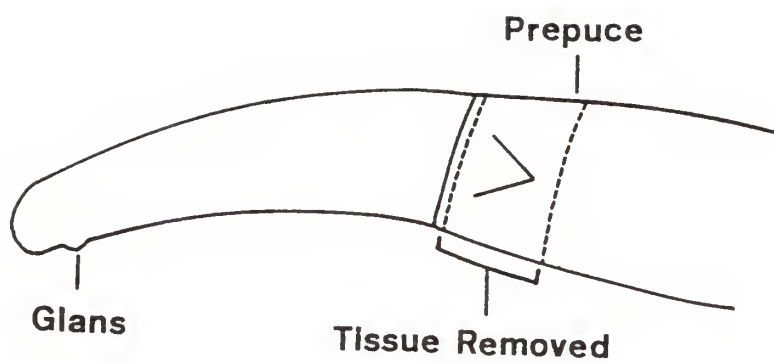


Figure 13

Site of preputial injury and corrective surgery.

PREPUTIAL SURGERY IN THE BULL

by

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AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

Twelve young Polled Hereford bulls that were sexually mature were used to evaluate a technique for removal of fibrous tissue from the prepuce. Six were used as controls and six had preputial lesions created to encourage fibrosis. Two types of aftercare are evaluated.

The surgical procedure involved removal of a band of preputial tissue completely around the penis just posterior to the attachment of the prepuce to the penis. All fibrous tissue was removed and the prepuce reattached to the penis.

On six of the bulls, the penis was bandaged in an extended position for forty-eight hours after which it was returned to its retracted position in the prepuce. The prepuce was flushed daily for three days with warm saline containing 1,000,000 units of crystalline penicillin and for seven days with warm saline only.

Six of the bulls had aftercare that consisted of daily flushing of the prepuce with penicillin in saline for three days and saline only for an additional seven days.

After a sixty-day interval, each of the bulls was examined for penile extension and evaluation of healing.

The preputial and penile tissues were recovered on slaughter and photographed. Histopathological examinations were made of the surgical site and the results evaluated.

The surgical procedure seems to be a valid one and minimal post-operative aftercare sufficient for good results.